

17457

21819

3 Hours / 100 Marks

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following:

20

- a) Differentiate between ‘mounting’ and ‘accessories’ used in pressure vessel.
- b) What is pressure vessel? How it is classified?
- c) Discuss the effect of design pressure and design temperature on design of pressure vessel.
- d) List any four bolting materials and write its composition.
- e) Compare welded joint v/s bolted joint in context of pressure vessel.
- f) Explain any one NDT method of welding inspection.
- g) Explain selection of material for hydrogen services with suitable example.
- h) What is stress concentration factor for a weldment design? How it is calculated?

P.T.O.

2. Attempt any TWO of the following:**16**

- a) Draw a neat sketch of pressure vessel and label it explain its terminology.
- b) A cylindrical shell is subjected to an operating pressure of 2 MPa. If internal diameter of shell is 4 m and maximum allowable stress is 140 MPa, calculate:
 - (i) Thickness of shell
 - (ii) Thickness of conical head if apex angle of cone is 55° . Take joint efficiency as 85% and corrosion allowance as 3 mm
- c) Explain stress concentration in circular and elliptical opening with neat sketch. Suggest remedies for it.

3. Attempt any TWO of the following:**16**

- a) What is ultra high pressure vessel? Write its design considerations and material used.
- b) What is nozzle reinforcements. Explain placement and shape of nozzle with sketches?
- c) Explain stress concentration fatigue concentration and its effect. How it is taken care while designing a pressure vessel elevated temperature?

4. Attempt any TWO of the following:**16**

- a) A pressure vessel consists of a cylinder of 1.5 m inside diameter and is closed by hemispherical ends. The pressure intensity of the fluid inside the vessel is not to exceed 2.08 N/mm^2 . The material of the vessel is steel having U.T.S as 420 MPa in tension. Calculate the required wall thickness of cylinder and the thickness of hemispherical ends, considering factor of safety as 4.
- b) Draw and explain the function:
- (i) Support skirts
 - (ii) Support lugs
 - (iii) Saddles
 - (iv) Stiffeners
- c) Explain for pressure vessel:
- (i) Dilation of pressure vessel
 - (ii) Ligament efficiency

5. Attempt any TWO of the following:**16**

- a) Explain the effect of wind load and piping load in pressure vessel design.
- b) Explain:
- (i) Stresses in bi-metallic joints
 - (ii) Deformation and stresses in flanges and flanged joints
- c) Explain:
- (i) Use of aluminum alloys and stainless steel
 - (ii) Method of applying protective layers

6. Attempt any FOUR of the following:**16**

- a) Explain staked plates and built up plates.
 - b) Explain design aspect of thick cylinders and thick spheres.
 - c) Discuss stress analysis of semi ellipsoidal heads and torispherical heads.
 - d) Sketch and draw symbol for any four welded joints used in pressure vessels.
 - e) List materials used for corrosive service and non- corrosive service.
 - f) State the factors to be considered while determining earthquake loads.
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